ASSESSMENT OF TREATED AND UNTREATED WATER OF GETALSUD RESERVOIR, RUKKA RANCHI, JHARKHAND

SYNOPSIS
Submitted

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1. INTRODUCTION:

Water has its own importance serve as a lifeline to human, plants and animals. Water must be safe for drinking with less and no impurities called potable water, stand with health issues. Half a century ago, most of the rivers in India were biologically in good condition, amply met the water needs of the populations and also supported diverse fish and flora species (World Bank 1998: 8). The National Water Policy (India) in 1987 was framed to report problems about planning, development and allocating groundwater and surface water India. It serves as a guideline in conservation and planning of water resources. At the dawning of a new millennium, at least one- fifth of all people worldwide lack access to safe drinking water, according to a 1999 United Nations (UN) comprehensive assessment of world water resources, and more than one-half of all people lack access to adequate sanitation {Tibbets2000}. If current trends continue, billions of people will lack access to safely managed drinking water services by 2030, making it difficult to meet Standards for sustainable Development Goal 6. According to WHO & UNICEF joint monitoring program report and it data also indicates that about 6% of India's population, which translates to roughly 80 million people, still lack access to at least basic drinking water services. By 2030, global demand for fresh water will exceed supply by 40%, leading to severe shortages in many regions according to Global Water Security Report by the U.S. National Intelligence Council.

The concept of water as a natural resource, which must be carefully managed is very important as growing populations and industrial developments demand ever-increasing supplies of water (Tebbutt, 1993). Water relates directly with the nutritional status of individual due to its important functions in the body. Human body requires minerals for its metabolism and water is a source of these minerals such as sodium, calcium and zinc (Pontius, 1994). Water quality is therefore an important aspect to observe as the majority of population in developing countries is affected by water-related diseases. Recent estimates suggest that 5-10% of deaths in these countries are due to water related diseases (Hammer & Hammer, 2003). Water quality refers to all attributes of water, which make it acceptable to the people {Shayo2007}. In certain cases, chemicals in water may be potential causes of diseases (Hammer & Hammer, 2003). Water derived from different sources may greatly differ in quality. Rainwater collects impurities while passing through the air, while stream and rivers collect impurities from surface run off. The complete valuations of water quality achieved through chemical analysis, biological test and physical measurements. Water necessary for public water supply schemes should be drinkable. The presence of some materials is very essential in food assimilation and for good test. The overall purification of water is time taking and costly. Therefore, impurities in water must be removed with certain extent to make it beneficial for human health. The construction, operation, supervision of water supply reservoirs and distribution system should exclude any possible pollution of the water (TBS, 1997).

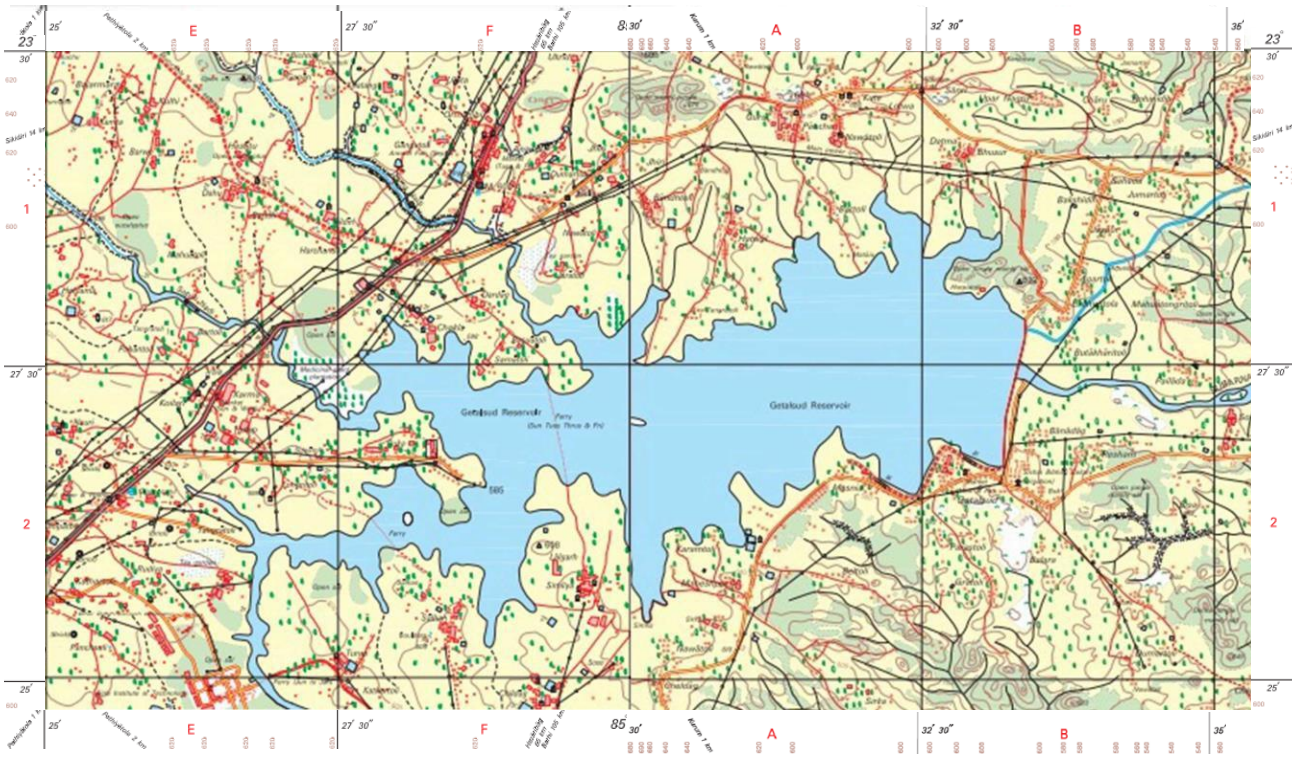
2. STATE OF THE ART:

Getalsud Dam is an artificial reservoir situated in Ormanjhi , Ranchi , Jharkhand. It was constructed across the Subarnarekha River and was opened in 1971. The reservoier, with a catchment area of 717 sq km, has full reservoir level of 1,954 ft . It is a popular picnic spot for the residents of Ranchi and Ramgarh District. The dam provides a small-scale fishing opportunity to the local people of Rukka. The main purpose of the dam is to fulfill the drinking water requirements of the residents of Ranchi. Apart from that, it is used for industrial purposes and generating electricity.Jharkhand's capital city Ranchi is reportedly battling a severe water crisis after the supply from the Rukka Dam to more than 25 wards of the city was disrupted the Rukka Dam is said to be the primary source of drinking water to above 55 localities in 25 wards, supplying around 30-35 million gallons daily. Among the localities dependent on the dam are the RIMS complex, Morabadi , Karamtoli , Lalpur , Kantatoli , Kokar, Tharpakhna, Upper Bazaar and Nivaranpur, with roughly seven lakh people At least four rivers – Harmu, Saphi , Potpota and Subernarekha - flow into Rukka dam (also known as the Getalsud). According to officials at the filtration plant in Rukka, a few rice and paper mills, industrial units such as Usha Martin and other ancillary units operate along the banks.

The Booty water supply system, having a treatment capacity of 170.48 MLD was commissioned in 1971, which is still operational and newly constructed water treatment plant, having a treatment capacity of 114 MLD which was commissioned in 2018 with water source from the Rukka reservoir on Subarnarekha River, 12.5km north of Ranchi City. The reservoir was constructed for dual purpose, namely for water supply to Ranchi City and for generation of hydropower. After Booty water supply system was set up, the existing Gonda and Hatia systems were connected to Booty system to provide flexibility to transfer and supply water to Ranchi City.

3. TOPOGRAPHY:

The area is located on Survey of India Topo-sheet No. 73E/7 & 73E/11, having latitude 23°27′24"N and longitude 85°33′19"E. The catchment area about 717 sq. km across Subarnarekha River in Ormanjhi of Ranchi district, Jharkhand, India



Topo-sheet No. 73E/7 & 73E/11

4. LOCATION AND ACCESIBILITY:

The dam is located on the north-eastern edge of Chota Nagpur Plateau. It is situated in Rukka Block of Ranchi district in Jharkhand, because of which it is locally known as Rukka Dam. The Getalsud Dam is located on the Subarnarekha River. The Getalsud Dam is around 35 km from Ranchi and around 30 km from Ramgarh.

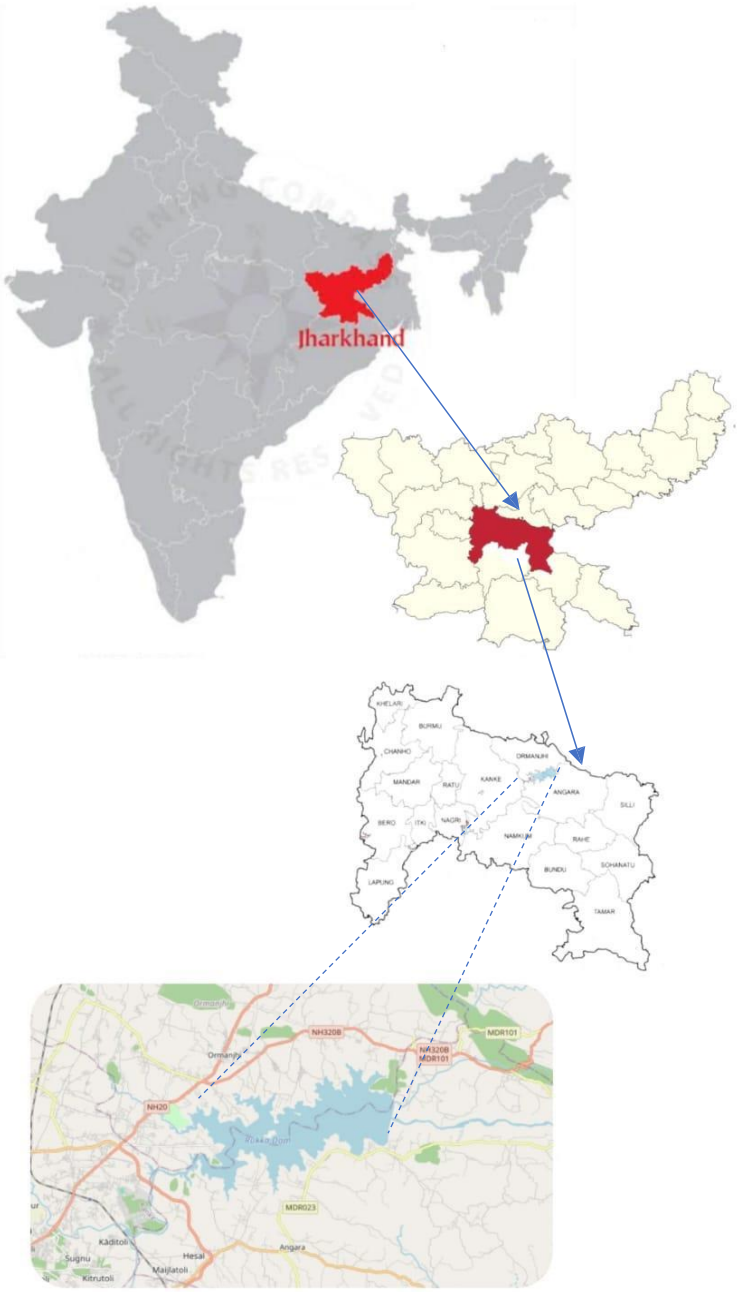


Fig 1: figure showing the study area in the map of India, Jharkhand & Ranchi district.

5. OBJECTIVE OF THE INVESTIGATI ON AND MOTIVATION:

1. To evaluate the water quality parameters of the two different sources i.e. , Getalsud Resevoir and supply water

   - Physical Parameters such as pH, Temperature, Turbidity, Conductivity, Total Dissolved Solid (TDS) etc.
   - Chemical Parameters such as Alkalinity, Silicate, Chloride, Calcium, Magnesium, Sulphate etc.
   - Biological Parameters such as phytoplankton and zooplankton.

2. To determine the concentration of heavy metals present in the Getalsud Reservoir.
3. To identify the source of contamination in the Reservoir due to the aforementioned water quality parameters.
4. To check the water quality status using the Water Quality Index (WQI).
5. To analyse the influence of seasonal variation on the physical and chemical properties of water.

The study will conclude whether the supply water is fit for drinking and check if dam water stands with the water quality standards by BIS or APHA.

6. RESEARCH DESIGN AND METHODOLOGY:

SAMPLI NG PROCEDURE:

- Water samples will be collected for two consecutive months from the two sampling sites of the Getalsud dam, one from dam and other one from supply water i.e. WTP from public taps.
- Both water samples will be taken in pre- cleaned sterile bottles as described by Harrigan & McCance (1976).
- The samples will be analysed in the (NABL accrediated) laboratory. The analysis will be done in two consecutive months and for which samples will be collected.
- Heavy metal indexing will be performed by comparing the water with HPI i.e. Heavy Metal Pollution Index.
- Water quality status will be checked by WQI i.e. Water Quality Index.
- Seasonal variation in physical and chemical parameter of water will be monitored.

7. TOOLS TO BE USED IN THE COLLECTI ON OF DATA:

- Sampling bottle: for collecting sample from the dam water.
- The Secchi Disk: to measure the turbidity of dam water and supply water.
- Digital pH meter: for determination of pH of water.
- Conductivity meter: for measuring conductivity of water.
- Spectro-photometer: for calculating absorbance of some parameters to determine its value like silicate at absorbance of 700 nm.

8. SIGNIFICANCE OF THE WORK, ITS RELEVANCE TO THE PRESENT- DAY PROBLEM AND NEED OF THE SOCIETY:

Clean water is a basic necessity for humans. While the human population grows, the demand for water grows as well. Since water is a finite resource, water must be treated before serve end- uses. Water treatment plants play a vital role in distributing safe drinking water, water treatment helps in removing contaminants and hazardous substances from the water, making it clean and safe to drink and be used for other purposes but without proper maintenance, these plants can become a breeding ground for harmful bacteria and viruses. Unfortunately, almost 2 billion people in the world use either untreated drinking water or get water from unsafe or contaminated sources. Proper maintenance of such a treatment plant may lead to improve water quality and prevent unsafe water-caused incidents, such as water-borne diseases and fatalities. The importance of water treatment plant maintenance can be overstated. Regular maintenance not only helps ensure the safety of the water supply but also helps extend the life of the plant itself.

9. CONTRIBUTION TO THE EXISTING KNOWLEDGE, FUTURE WORK:

The physio chemical parameter of Dam Water will be compared with Bureau of Indian Standards (BIS) or American Public Health Association (APHA).

The research has the potential to contribute to existing knowledge and future work in several ways:

Existing Knowledge

- Water Quality Assessment: The study likely provides a comprehensive assessment of the water quality parameters of both treated and untreated water from the Getalsud Reservoir. This information can be used to compare the effectiveness of the treatment process and identify areas where improvements can be made.
- Impact Assessment: The research might assess the potential impact of the reservoir's water quality on the surrounding environment and human health. This could include evaluating the presence of pollutants, pathogens, or other contaminants that could pose risks.
- Baseline Data: The study establishes a baseline for future monitoring and evaluation of water quality in the Getalsud Reservoir. This baseline data can be used to track changes over time and identify trends.

Future Work

- Treatment Process Optimization: Based on the findings of the research, future studies could focus on optimizing the treatment process to improve water quality and efficiency. This could involve investigating new technologies or modifying existing ones.
- Long-term Monitoring: Continued monitoring of the reservoir's water quality is essential to track changes over time and identify potential issues early on. This could include regular sampling and analysis of water samples.
- Public Health Impact: Further research is needed to understand the potential impact of the reservoir's water quality on public health. This could involve epidemiological studies to assess the relationship between water quality and disease incidence.
- Environmental Impact: The study could contribute to a better understanding of the environmental impact of the reservoir and its water quality. This could include assessing the impact on aquatic ecosystems and the surrounding land.
- Policy and Management: The findings of the research can inform the development of policies and management strategies for the reservoir and its water resources. This could include regulations to control pollution and ensure the sustainable use of the water.

Overall, the research on the assessment of treated and untreated water from the Getalsud Reservoir can contribute to a better understanding of water quality issues in the region and provide valuable information for future research, policy development, and management decisions.

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